MODIS
Data Management Plan
Beta Version

October 6, 1995

SDST-006

MODIS
Data Management Plan - Beta Version

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1. INTRODUCTION

1.1 Document Identification

This document is the Data Management Plan (DMP) for the data sets associated with the Beta Version of the Moderate Resolution Imaging Spectroradiometer (MODIS) Science Data Processing Software. The plan for the Versions 1 and 2 data sets will be presented in a future version of this document. This document will be updated in September 1996 with the detailed plan for the Version 1, and a preliminary version of the plan for the Version 2.

1.2 Document Scope

This document identifies and describes the following for the Beta Version:

- the MODIS Standard Data Products (SDPs) and the data sets involved in their generation,
- the data management services provided by the MODIS Science Team
- the activities (and related schedules) in which the MODIS Science Team will participate in order to coordinate with other Earth Observing System (EOS) Data and Information System (EOSDIS) development efforts.

This version of the plan, the Beta Version, provides information related to the AM-1 Standard and Special At Launch (AL) Data Products and associated quality assessment data sets. It also provides information related to the data sets needed for SDP generation (ancillary data), and test and verification data sets.

All MODIS Beta Version integration and test within the EOSDIS Core System (ECS) will be done at the Goddard Space Flight Center (GSFC) DAAC.

1.3 Document Purpose

This document, the MODIS DMP - Beta Version, presents the MODIS Science Team's plan for:

- Defining the data sets that the Team is responsible for generating in accordance with the MODIS Science Team Leader Working Agreement (TLWA).
- Providing the data management functions that will be performed by the MODIS Science Team.
- Coordinating with other organizations, such as EOS Science Office, the Earth Science Data and Information System (ESDIS) Project, and the Distributed Active

Archive Centers (DAACs), for the development of data management systems and services for the MODIS data sets.

This document fulfills the TLWA's requirement for the Beta Version to submit a DMP for approval by the EOS AM-1 Project Instrument System Manager (ISM).

1.4 Document Organization

Section 1 provides purpose, scope, and plan for this document and

Section 2 identifies related documents.

Section 3 identifies and describes the MODIS data sets that are to be managed in accordance with this plan.

Section 4 identifies the organizations that have activities related to MODIS data sets that are the to be managed in accordance with this plan, and provides an overview of their roles and responsibilities.

Section 5 provides a description of the plan for the definition and development of the MODIS data sets covered by this plan.

Section 6 provides a description of the plan for quality assurance of these data sets.

Section 7 provides a description of the plan for verification of these data sets.

Section 8 provides a description of the plan for configuration management of these data sets.

Section 9 provides a description of the plan for services related to the management of these data sets.

Section 10 provides a description of the risks related to the data sets for the Beta Version and the plan for their mitigation.

2. RELATED DOCUMENTATION

The following documents serve to provide information relevant to the MODIS DMP:

- MODIS Science Computing Facilities (SCF) Plan, August 1993.
- Science Software and Data Management Requirements-Preliminary Draft Version, EOSDIS Project, July, 1993.
- MODIS Operations Concept Document-Version 1, SDST, August 1993.
- EOS Science Processing Database (for Product Identification), Ongoing Updates.
- Team Leader Working Agreement for MODIS Between EOS AM & PM Projects GSFC and the MODIS Science Team Leader, April 21, 1994, GSFC 421-12-14-02.
- MODIS Beta Release Requirements Specification, Septemebr 1995,SDST-020A
- MODIS Software Development Standards (SDS) and Guidelines, Version 1, February 15, 1995.
- Science User's Guide and Operations Procedure Handbook for the ECS Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; January 1995; 205-CD-002-001.
- Data Production Software (DPS) and SCF Standards and Guidelines; January 1994.
- MODIS Level 1B Algorithm Theoretical Basis Document, April 1995.
- Science Software Integration and Test Procedures for the MODIS Instrument at the GSFC DAAC, September 1995, SDST-017.
- MODIS Software Management Plan; September 1995; SDST-002

The following documents are companion volumes of the MODIS Data Management Plan and shall be completed in 1995:

- MODIS Beta System Test Plan, April 1995; SDST-005
- MODIS Configuration Management Plan; June 1995; SDST-004
- MODIS SDST Software Quality Assurance Plan; June 1995; SDST-003
- MODIS Product Volume and Process Load Estimates: Assuptions and Computations; August 11, 1995; SDST-009
- MODIS Science Validation Plan, TBD
- MODIS Characterization Support Team Management Plan, NASA Technical Memorandum 104594

3. MODIS DATA

There are two objectives for the Beta Version:

1. To learn about the data set interfaces in the DAAC environment.

2. To work out effective procedures related to data management during delivery, integration and test, and DAAC operations.

The MODIS Science Team will have representative programs and related data sets for calibration, geolocation, and each of the discipline groups (Atmosphere, Land, and Oceans).

Since the Beta Version is not intended to be a component of an operational system, information specifically related to operational considerations has been deferred to the update of the plan for the Version 1 delivery (this includes items such as those related to temporary data sets, EOSDIS provided ancillary data, and data production operations support).

3.1 Standard Data Products

3.1.1 Identification

The MODIS TLWA identifies the following SDPs for the MODIS Science Team:

ID	Product Name
MOD01	Level-1A Radiance
MOD02	Level-1B Radiance
MOD03	Geolocation Fields
MOD04	Aerosol Product
MOD05	Precipitable Water
MOD06	Cloud Product
MOD07	O3 Total Burden
MOD08	Stability (Lifted Index), Atmosphere
MOD09	Surface Reflectance
MOD10	Snow Cover
MOD11	Land_sfc Temperature/Emissivity
MOD12	Land_Cover Type
MOD13	Vegetation Indices
MOD14	Thermal Anomalies (Fire Size and Temperature)
MOD15	Leaf Area Index (LAI) and Fractional Photosynthetically Active Radiation (FPAR)
MOD16	Evapotranspiration
MOD17	Vegetation Production, Net Primary Production (NPP)
MOD18	Level-2 Radiance, Water-leaving
MOD19	Pigment Concentration, Coastal Zone Color Scanner (CZCS)
MOD20	Chlorophyll Fluorescence
MOD21	Chlorophyll_a Pigment Concentration
MOD22	Photosynthetically Active Radiation (PAR)
MOD23	Suspended-solids Concentration, Ocean Water

MOD24 Organic Matter Concentration
MOD25 Coccolith Concentration, Detached
MOD26 Ocean Water Attenuation Coefficient
MOD27 Ocean Productivity
MOD28 Sea-sfc Temperature (SST)
MOD29 Sea_Ice Maximum Extent
MOD30 Temperature and Moisture Profiles
MOD31 Phycoerythrin Concentration
MOD32 Calibration Data, MODIS
MOD33 Gridded Snow Cover
MOD34 Gridded Vegetation Indices (Max NDVI and Integrated MVI)
MOD36 Absorption Coefficient Total
MOD37 Ocean Aerosol Properties
MOD38 Water Vapor, Atmospheric (Thermal Infrared)
MOD39 Clear Water Epsilon

The Science Processing Support Office (SPSO), under the direction of the EOS Senior Scientist, provides a data base of the EOS SDPs with associated configuration controlled attributes. In addition to the SDPs identified in the TLWA, the MODIS Science Team will provide a "Utility Masks" data product; this appears as MOD35 in the SPSO database Version 3. Also, the MODIS Science Team will provide a “Fires and Biomass Burning” data product, MOD40 and a “Gridded Sea Ice” data product, MOD42. The parameters of these products were originally components of MOD14 and MOD29 respectively, but were subsequently designated as a separate products in the SPSO database.

The MODIS Science Team will participate in the work of the Ad Hoc Working Group on Processing (AHWGP) activities, and will provide best effort estimates of data set size to support ECS development activities. These are documented in the version of the MODIS Data Products Volumes and Processing Loads document released in August 1995.

The MODIS Science Team will provide periodic updates to the SDP list and their associated configuration controlled data set attributes; specifically, at the time of each of the software releases (Beta, Version 1, and Version 2) as stipulated in the Science Software Integration and Test Procedures for the MODIS Instrument at the GSFC DAAC (SSI&T) document. Appendix B provides the SPSO database of the MODIS SDPs and their associated configuration controlled data management attributes. Appendix C identifies the MODIS SDPs that will be generated by the MODIS Beta Version of the software.

3.1.2 Dependencies

- Intra-MODIS SDP dependencies.
  - The Beta Version Intra-MODIS SDPs and their relationships are presented in the Beta Release Requirements Specification.
- MODIS SDP dependencies on other EOS SDPs.

- No dependencies of this type have been identified for the Beta Version.

- Other EOS SDP dependencies on MODIS SDPs.
  - The MODIS Science Team is not aware of any Beta Version SDP generation by another science team that requires a MODIS SDP as input.

3.2 Special Data Products

The SPSO Database Version 3 identifies MOD31 as an AL Special Data Product; for the Beta Version, the MODIS Science Team will treat this data set as if it were a SDP.

There are no other MODIS AM-1 AL Special Data Products; however, there are other MODIS AM-1 Post Launch (PL) Special Data Products; these will be addressed in a future version of this document.

3.3 Browse Data Products

No MODIS Browse Data Products have been defined for the Beta Version.

Version 1 Browse Data Products may be constructed by performing standard subsetting and subsampling operations on the SDPs. The Science Data Support Team (SDST) will provide information on the subsetting and subsampling operations appropriate for each of the SDPs.

3.4 Ancillary Data Sets

There are two types of MODIS Ancillary Data Sets:

1. EOSDIS-provided ancillary data may be either from an external source such as National Oceanic and Atmospheric Administration, or an internal source such as the GSFC Data Assimilation Office. There are no external or internal ancillary data sets required for MODIS processing for the Beta Version.

2. MODIS-provided ancillary data are identified in the Beta Release Requirements Specification for the MODIS Beta Version.

3.5 Verification Data Sets

MODIS Science Team will provide data sets that will be used to check the output of the processing of the MODIS software in the DAAC environment. The verification data sets are further described in the MODIS SDST Test Plan and the SDST Test Data Plan. The data sets required for verification will be identified as stipulated in the SSI&T document.

3.6 Test Data Sets

MODIS Science Team will provide data sets that will be used to test the operation of the MODIS software in the DAAC environment.

The test data sets are further described in the MODIS SDST Software Test Plan and the SDST Test Data Plan.

The data sets required for testing will be identified as stipulated in the SSI&T document.

3.7 Quality Assessment Data Products

These data products will be produced as part of the SDP generation process in the DAAC operational system; they may be sent to the Team Leader Computing Facility (TLCF) or other MODIS Science Computing Facilities (SCFs) to support SDP quality assessment activities. These data sets will not be generated by the Beta Version software.

4. ORGANIZATIONS AND ROLES AND RESPONSIBILITIES

The roles and responsibilities among the MODIS Science Team the DAACs are delineated in the Software Management Plan and the SSI&T document.

5. DATA PRODUCT DEFINITION APPROACH

5.1 Schedules

The Beta Version data sets will be identified, described, and delivered to the GSFC DAAC in accordance with the schedules specified in the MODIS Software Management Plan (SMP), and the SSI&T document. Additionally, the SDST will complete and publish the Beta Version MODIS Data Product Catalog in October 1995.

5.2 Compliance with Standards

The Beta Version SDPs will be a preliminary version; however, a substantial effort is being made to conform to the emerging EOSDIS standards. To that end, all Beta Version SDPs will be in Hierarchial Data Format (HDF) and the Version 1 SDPs will be fully compliant with EOSDIS Standards, including incorporation of EOSDIS core metadata, and will be produced in their final design form.

5.3 Science Review and Evaluation

MODIS Science Team will provide the MODIS Data Product Catalog to facilitate science review and comment on the form and content of these products. In addition, review and comment on the SDP format and content will be a component of each of the MODIS Science Team meetings and the MODIS Discipline Team meetings; the SDST will participate in these activities. Additionally, the MODIS Science Team will participate in data product review activities of the EOS Investigators' Working Group (IWG).

5.4 Coordination with the GSFC Mission to Planet Earth Office

The MODIS Science Team will participate in activities as requested by the GSFC Mission to Planet Earth Office related to MODIS data products, and associated test data sets.

5.5 Coordination with the EOS Science Office

The MODIS Science Team will participate in the data product review activities of the EOS Science Office and will provide updates to the SPSO Database in association with each delivery.

5.6 Coordination with the EOS AM Project

The MODIS Science Team will participate in the Science Working Group of the AM Project (SWAMP) in their work related to the MODIS SDPs, and associated test and verification data sets.

5.7 Coordination with the DAACs

The MODIS Science Team will coordinate with the GSFC DAAC and will document agreements related to the Beta Version delivery integration and test in the SSI&T document.

5.8 Coordination with ESDIS Project Information Systems Development

All of the Beta Version SDPs will be in HDF, but may not be in their final data structure design form. The SDST will make an effort to coordinate with the ECS contractor and the MODIS Science Team members who are developing the Level 2 and Level 3 SDP generation software to design these products to be compatible with the EOSDIS "Swath" and “Grid” data constructs. The SDST will coordinate with the AHWGP to provide updates to the ECS modeling efforts. The SDST will participate in the Design Working Group (DWG) and the Data Modeling Working Group (DMWG) activities.

5.9 Data Engineering Activities

Data Engineering activities for the Beta Version will include the following:

- Develop and maintain the Data Product Catalog.
- Participate in the ESDIS Project and DAAC data set standards and data modeling activities, specifically in the DWG and the DMWG, and specify for each delivered data set the applicable standards and guidelines.
- Represent and analyze the information flow related to the generation of the MODIS SDPs.
- Design and document the SDP formats.
- Design, develop, and document the MODIS Science Team provided ancillary data sets.
- Design, develop, and document of the L1 and geolocation test data sets.
- Provide updates to the SPSO, AHWGP, and other efforts for MODIS data sets and their associated attributes.
- Provide information on the subsetting and subsampling operations appropriate to the generation of Browse data products for each of the SDPs.
- Develop tools and associated guidance for their use for data set production, development, and verification.
- Provide naming (and other needed data set reference), information, and associated installation procedures for data sets delivered to the DAAC.
- Identify the version(s) of executable software with which the deliverable data sets are compatible.
- Analyze problem reports related to delivered data sets.
- Formulate corrective actions related to problems with delivered data sets.

6. DATA SET QUALITY ASSURANCE

The Quality Assurance (QA) for data sets provided by the MODIS Science Team that support data production will include the following:

- Assuring that all data sets needed for SDP generation are included in the delivery package.
- Assuring that the delivered data sets conform to EOSDIS standards and requirements.
- Assuring that the MODIS SDST and MODIS Characterization Support Team (MCST) delivered data sets conform to their approved designs.
- Assuring that the Processing Files Description Document correctly describes the delivered files.

These activities and procedures are more fully described in the MODIS SDST QA Plan.

7. DATA SET VERIFICATION

The MODIS SDST will perform the following data set verification activities for the Beta Version:

- Verify that the SDP data sets are consistent with the MODIS Data Product Catalog and all applicable design standards and guidelines.
- Verify that all Intra-MODIS SDP dependencies identified in the MODIS Beta Release Requirements Specification are satisfied.

These activities and procedures are more fully described in the MODIS Beta Software Test Plan and the MODIS SDST Test Data Plan.

8. DATA CONFIGURATION MANAGEMENT

The MODIS SDST Manager will maintain configuration control of the approved version of the Data Product Catalog.

The MODIS SDST Configuration Management Officer (CMO) will maintain configuration control at the TLCF of all data sets provided by any MODIS development organization before they are delivered to the DAAC in conformance with the procedures described in the MODIS CM Plan.

After successful completion of the Inspection Review as described in the SSI&T document, the delivered data sets will be placed under configuration control by the DAAC. After notification by the DAAC that it has established configuration control of the delivered data sets, the CMO will obtain a copy from the DAAC in accordance with the procedures described in the SSI&T document. The CMO will verify that the data sets under DAAC CM are identical to the data sets that were delivered.

See the SSI&T document and the DAAC operations and service description documents for more information on the CM activities and services provided by the DAAC.

9. DATA PRODUCT SERVICES

9.1 Data Product Descriptions

The MODIS SDST will provide the MODIS Data Product Catalog of SDPs; the catalog provides information on the data products' form and content. The Catalog will be available for physical and electronic dissemination.

9.2 Other Services

Other data management services related to SDP generation, storage, configuration management, search, and distribution are provided by the DAAC and are described in the DAAC operations and service description documents.

10. DATA MANAGEMENT RISKS AND THEIR MANAGEMENT

10.1 Risk Management Approach Related to Data Management

The risk management approach, process, and participants are described in the MODIS Software Management Plan.

10.2 Risks Related to the Beta Version

There are no data management related difficulties that pose a risk to the accomplishment of the objectives of the Beta Version of the MODIS science software.

APPENDIX A: ACRONYMS

AHWGP	Ad Hoc Working Group on Production
AL	At-Launch
CMO	Configuration Management Officer
CZCS	Coastal Zone Color Scanner
DAAC	Distributed Active Archive Center
DMP	Data Management Plan
DMWG	Data Modeling Working Group
DWG	Design Working Group
ECS	EOSDIS Core System
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
FY	Fiscal Year
FPAR	Fractional Photosynthetically Active Radiation
GSFC	Goddard Space Flight Center
HDF	Hierarchical Data Format
ISM	Instrument System Manager
IWG	Investigators' Working Group
LAI	Leaf Area Index
MCST	MODIS Characterization Support Team
MODIS	Moderate Resolution Imaging Spectroradiometer
MVI	MODIS Vegetation Index
NDVI	Normalized Difference Vegetation Index
NPP	Net Primary Production
PAR	Photosynthetically Active Radiation
PL	Post-Launch
QA	Quality Assurance
SCF	Science Computing Facility
SDP	Standard Data Product
SDST	Science Data Support Team
SMP	Software Management Plan
SPSO	Science Processing Support Office
SSI&T	Science Software Integration and Test Procedures for the MODIS Instrument at the GSFC DAAC
SST	Sea Surface Temperature
SWAMP	Science Working Group of the AM Project
TLCF	Team Leader Computing Facility
TLWA	Team Leader Working Agreement

APPENDIX B: MODIS STANDARD PRODUCTS

(Insert Charts)

APPENDIX B: MODIS STANDARD PRODUCTS (CONTINUED)

(Insert Charts)

APPENDIX B: MODIS STANDARD PRODUCTS (CONTINUED)

(Insert Charts)

APPENDIX C: MODIS SDP LIST FOR THE BETA VERSION

MOD01	Level-1A Radiance
MOD02	Level-1B Radiance
MOD03	Geolocation Fields
MOD04	Aerosol Product
MOD05	Precipitable Water
MOD06	Cloud Product
MOD07	O3 Total Burden
MOD08	Atmospheric Stability (Lifted Index)
MOD09A	Surface Reflectance
MOD09B	BRDF and Albedo
MOD10	Snow Cover
MOD11	Land Surface Temperature (LST) and Emissivity
MOD12	Land Cover Type
MOD13	Vegetation Indices
MOD14	Thermal Anomalies (Fire Size and Temperature)
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MOD38	Atmospheric Water Vapor (Thermal Infrared)
MOD39	Clear Water Epsilon
MOD40	Fires and Biomass Burning
MOD42	Gridded Sea Ice